



# GOD BEFORE THE BIG BANG

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## ABSTRACT

This paper approaches the subject of God or a supernatural being that created the universe from a mathematical and physical point of view. It sets up a hypothesis that when the God existed before the Big Bang as an unconscious being became conscious, the energy that was produced during the process became a both highly dense and infinite temperature Cosmic Egg and exploded to create the current universe. This assumption is demonstrated by mathematical formulas and physics law, which provide a solid scientific foundation for the aforementioned theory.

**KEYWORDS:** big bang, recursive Heaviside step function, mental world.

## Introduction

According to the recent Big Bang theory that explains the beginning of life in the universe, humans with an ego only appeared on earth 13.8 billion years after the universe was created. Regarding topics such as where we come from and where we go, humans have shown great interest in matter of birth and death, as well as our place of origin and beyond upon death, while religion ceaselessly attempted to provide the answer. Therefore, it is possible to say that the origin of religion can be traced as far as back to the birth of human beings.

Classical physics has evolved from Newton's classical mechanics to more advanced Einstein's general theory of relativity, quantum mechanics and particle physics, and made a great progress in understanding from the macro to micro side of the material universe. Furthermore, physicists came to accept the Cosmic Background Radiation Theory on the primeval universe which explains that the universe began to form from a single point with a very high density and temperature. With these developments, there was another attempt to explain the structure of the universe using the Superstring Theory. From the 1970s to 1980s, John H. Schwarz and Michael Green argued that all matter in the universe is composed of tiny strings of energy that vibrate in various dimensions. The Membrane Theory, a Big Bang Theory that explains how the universe came to be, also attempts to describe how the Big Bang happened[1]. Edward Witten brought five different string theories together and argued that the Big Bang was created by a collision of membranes between two parallel universes[2].

This paper, however, puts forward a hypothesis that assumes time started when God or a supernatural being that had existed as an ultra-unconscious being became conscious, and a gigantic amount of high energy was released in the process. According to the hypothesis, the energy with an ultra-high density that was released during the unconscious-to-conscious process is assumed to be the Big Bang. The paper argues that the ultra-unconscious being (God or a supernatural being) can be expressed using the infinite recursive Heaviside step function, and assumes it as the God's potential. The sumption is that differentiation of the potential with respect to time is the process of becoming conscious, and in a world where only time exists, the energy produced thereafter became a highly dense Cosmic Egg.

## Potential, Force, and Energy

In this paper, we attempt to postulate the existence of God through mathematical theories. Let it be clear that by trying to express the existence of God using simple mathematical formulas, the paper does not intend to display any disrespect for God. This is one of many attempts to define God as a concept comprehensible to humans.

Before dealing with numerical formulas related to God, we first look at the potential theory which is often cited in the study of physics. The potential theory is applied to the studies of gravitational field and electrostatic field, and to derive Green's functions for elastic wave equations in an infinite homogeneous medium[3], which are a set of hypothetical concepts in physics and mathematics that we cannot feel or touch.

For example, the gravitational potential is expressed as Eq. (1):

$$-G \frac{m}{r} \quad (1)$$

in here,  $G$  represents the gravitational constant,  $m$  represents the mass, and  $r$  represents the distance. When we differentiate Eq. (1) with respect to  $r$ , we obtain Eq. (2), which is now transformed into a concept on power.

$$-G \frac{m}{r^2} \quad (2)$$

And such a formula on power as formula (2), when integrated with respect to the unit length, becomes an energy formula.

$$E = \int -G \frac{m}{r^2} dr \quad (3)$$

## God's Advection Equation

The one-dimensional advection equation is expressed as below

$$\frac{\partial u}{\partial t} + \frac{\partial u}{\partial \tau} = 0 \quad \text{where } t > \tau_k, \tau_k < 0. \quad (4)$$

Here,  $u$  is the ultra-unconscious potential,  $t$  is the present time and  $\tau$  is the past time. Eq. (4) can be reorganized into Eq. (5).

$$\frac{\partial u}{\partial t} = -\frac{\partial u}{\partial \tau} \quad (5)$$

The general solution of Eq. (5) is  $u=f(-t-\tau)$ , and the particular solution is:

$$u=H[-t-\tau H[-t-\tau H[-t-\tau H[-t-\tau \dots]]]] \quad (6)$$

Let's call this particular solution an  $n$ th degree recursive Heaviside step function. For example, a quadratic recursive Heaviside step function is written as below. From the fact that Eq. (6) meets the requirements to be a homogeneous advection equation, we postulate that God has always existed in the single-dimensional time.

$$u=H[-t-\tau H(-t-\tau)] \quad (7)$$

Eq. (7) is differentiated with respect to  $t$  as follows:

$$\frac{\partial u}{\partial t} = \delta[-t - \tau H(-t - \tau)] [-1 + \tau \delta(-t - \tau)] \quad (8)$$

When  $t=-\tau$ ,

$$\begin{aligned} \frac{\partial u}{\partial t} &= \delta(-t - \tau) [-1 + \tau \delta(-t - \tau)] \\ &= -\delta(-t-\tau) + \tau \delta^2(-t-\tau) \\ &= -\delta(0) + \tau \delta^2(0). \end{aligned} \quad (9)$$

When we differentiate Eq. (6) with respect to the  $n$ th degree recursive formula, the result is as follows:

$$\frac{\partial u}{\partial t} = - \sum_{k=1}^n \tau^{k-1} \delta^{(k)}(-t-\tau). \quad (10)$$

The infinite recursive formula is:

$$\frac{\partial u}{\partial t} = - \sum_{k=1}^{\infty} \tau^{k-1} \delta^{(k)}(-t-\tau). \quad (11)$$

God, expressed as a potential of the unconscious, is psychokinesis (a force that only exists in time) that is beyond human imagination at the moment of differentiation. When multiplied by the unit time at the instant when God began to work, an infinite amount of energy is released which is only defined in time. This is equivalent to the Big Bang in modern physics. The hypothesis is that there was only time and no space before the Big Bang. Therefore, if we multiply the function by  $\Delta t$  (unit time) and psychokinesis which is defined in time, we obtain energy as a result. After the creation of the time, space and our time emerged as a result of the Big Bang. Here, Eq. (7) includes a discontinuous function. Although it is impossible to differentiate the equation by using the general chain rule, we get the same result when we introduce the sequences of both the Heaviside step function and the delta function. We look at this issue in the next section.

#### God's Potential

If  $n=3$ , for example God's potential is expressed as below:

$$P_{\text{god}} = U_3(t, \tau) = H\{-t - \tau H[-t - \tau H(-t - \tau)]\}. \quad (12)$$

Although Eq. (12) is established when  $n=3$ , we always obtain the same graph regardless the size of  $n$ .

Figure 1 and Eq. (12) both demonstrate the potential of God, and it is necessary to have a closer look at Eq. (12) to examine the process of the potential transforming into energy. The recursive

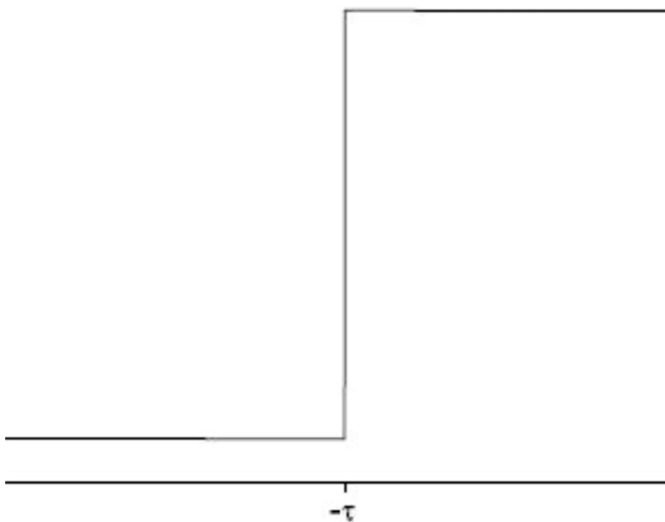


Figure 1. Plots of  $H(-t-\tau)$ .

Heaviside step function that represents God's potential in this paper includes an infinite number of discontinuous functions. However, the shape of the graph remains the same even if there are multiply recursive Heaviside step functions. In the case of the continuous function, it is possible to carry out differentiation by the chain rule, but it is impossible to do the same with the recursive Heaviside step function because numerous discontinuous functions that exist therein. In this paper, therefore, we replace the Heaviside step function as a Heaviside step sequence as

$$H(t-t_0) = \lim_{k \rightarrow \infty} \frac{1 + \tanh k(t-t_0)}{2}. \quad (13)$$

We put Eq. (13) into recursive Heaviside step function like partial fraction function with respect to  $(t-t_0)$ , then find the limit of  $k'$  and of  $k$  in order. Similarly, the next equation shows the sequence of the delta function.

$$\begin{aligned} \delta(t-t_0) &= \lim_{k' \rightarrow \infty} \frac{d}{dt} \frac{1 + \tanh k'(t-t_0)}{2} \\ &= \lim_{k' \rightarrow \infty} \frac{k'}{2} \text{sech}^2 k'(t-t_0). \end{aligned} \quad (14)$$

For instance, we define function  $u$  as follows:

$$u = H[-t - \tau H(-t - \tau)]. \quad (15)$$

When a Heaviside step sequence is replaced into Eq. (15) in order it becomes:

$$u = \lim_{k \rightarrow \infty} \lim_{k' \rightarrow \infty} \frac{1 + \tanh k \left( -t - \tau \left[ \frac{1 + \tanh k'(-t-\tau)}{2} \right] \right)}{2}. \quad (16)$$

Eq. (16) is differentiated to yield Eq. (17):

$$\begin{aligned} \frac{\partial u}{\partial t} &= \lim_{k \rightarrow \infty} \lim_{k' \rightarrow \infty} \frac{k}{2} \text{sech}^2 \left( -t - \tau \left[ \frac{1 + \tanh k'(-t-\tau)}{2} \right] \right) \\ &\quad \times \left( -1 + \tau \frac{k'}{2} \text{sech}^2 k'(-t-\tau) \right) \\ &= \lim_{k \rightarrow \infty} \frac{k}{2} \text{sech}^2 [-t - \tau H(-t - \tau)] [-1 + \tau \delta(-t - \tau)] \\ &= [-1 + \tau \delta(-t - \tau)] \delta(-t - \tau) \\ &= -\delta(-t - \tau) + \tau \delta^2(-t - \tau). \end{aligned} \quad (17)$$

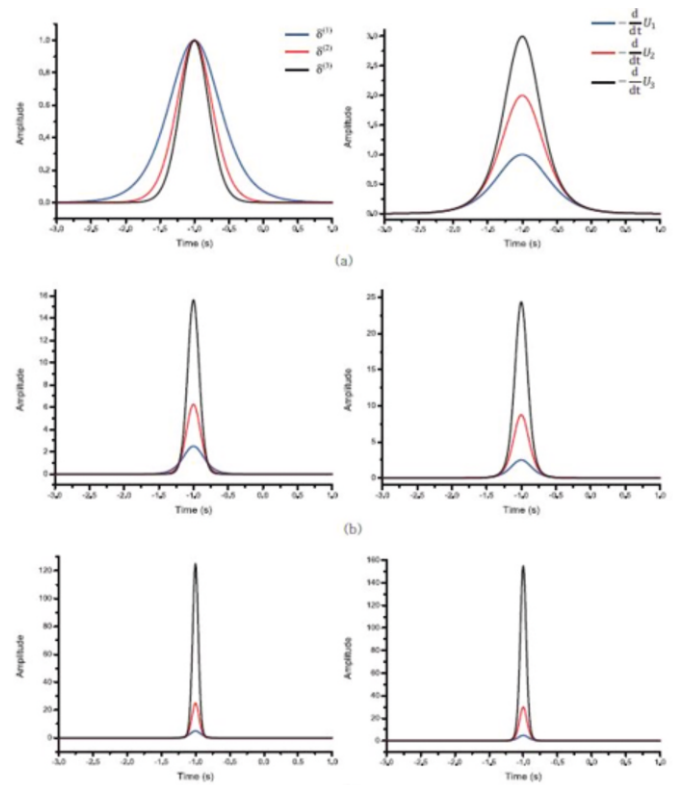


Figure 2. On the left-hand side,  $\delta_k(-t-\tau)$  (blue),  $\delta_k^{(2)}(-t-\tau)$  (red), and  $\delta_k^{(3)}(-t-\tau)$  (black) are drawn when  $\tau=-1$ , and on the right-hand side, the derivatives of  $U_1(t, \tau)$  (blue),  $U_2(t, \tau)$  (red), and  $U_3(t, \tau)$  (black) obtained by Eq. (13) are drawn when  $\tau=-1$  for three cases (a)  $k=2$ , (b)  $k=5$ , and (c)  $k=10$ , respectively. For the Dirac delta function, an approximate representation  $\delta_k(t-t_0)$  given by Eq. (15) is used. Note that the scale for the vertical axis is different for all of the graphs.

We learned an interesting fact from Eq. (14). The delta function in Figure 2 is also defined as infinite, but the square, the cube, and the infinite square of delta function all differ in size despite being infinite. Furthermore, the distribution of the larger power of delta function than two is not defined [4].

If we hypothesize that God is represented by the infinite recursive Heaviside step function and was conscious at a certain point of time  $-\tau$ , it is possible to conclude that the unconscious-to-conscious energy of the ultra-conscious being (God) is enough to create the universe. There is no way of knowing how recursive the function was, but we can say that God was an ultra-unconscious being, and that the current universe was created at the moment of him being conscious when he produced an energy of an infinite high temperature and an infinite density that is the foundation of explaining the universe in modern physics.

It seems, however, that God did not go through another process of becoming conscious since the birth of the universe. An enormous amount of energy would have been produced if there was another unconscious-to-conscious transforming process, and the universe would have collapsed. In this sense, Friedrich Nietzsche's famous statement that the God is dead might hold some truth. God created the universe, but did not further work on it. At least the infinite recursive ultra-unconscious being does not become conscious.

On the contrary, when we hypothesize that God is omnipotent, a relatively small amount of energy may be released if he becomes conscious after reducing the recursive infinite ultra-unconscious being into a finite value. Perhaps God is an ultra-unconscious being capable of voluntarily controlling the recursive Heaviside step function. One thing to keep in mind is that the size of the ultra-unconscious being (God) is one, and the size does not matter. In this case, as an infinite amount of energy is produced during the process of becoming conscious, it is possible to say that God continues to be work after the creation of the universe.

### Conclusion

Humans have built great civilizations through the development of mathematics and science. However, there is yet to be a mathematical or physical approach to the metaphysical being of God. This paper attempted to examine God's creation of the universe by introducing the infinite recursive Heaviside function (ultra-unconscious being: God) which is the solution for the one-dimensional advection equation for a point of time in the present and a point of time in the past, differentiation, energy, and the concept of time instead of distance that is often used in the study of physics.

Would it not be easier for us to accept the idea of God who created the universe is a metaphysical ultra-unconscious being rather than a physical existence?

### REFERENCES

1. D. Cha, Personal communication.
2. S. Nam, Personal communication.
3. W. Pilant, Elastic Waves in the Earth. (Elsevier Scientific Publishing Company) (1979).
4. W. Zauderer, Partial Differential Equations of Applied Mathematics. (John Wiley and Sons Inc.) (2006).